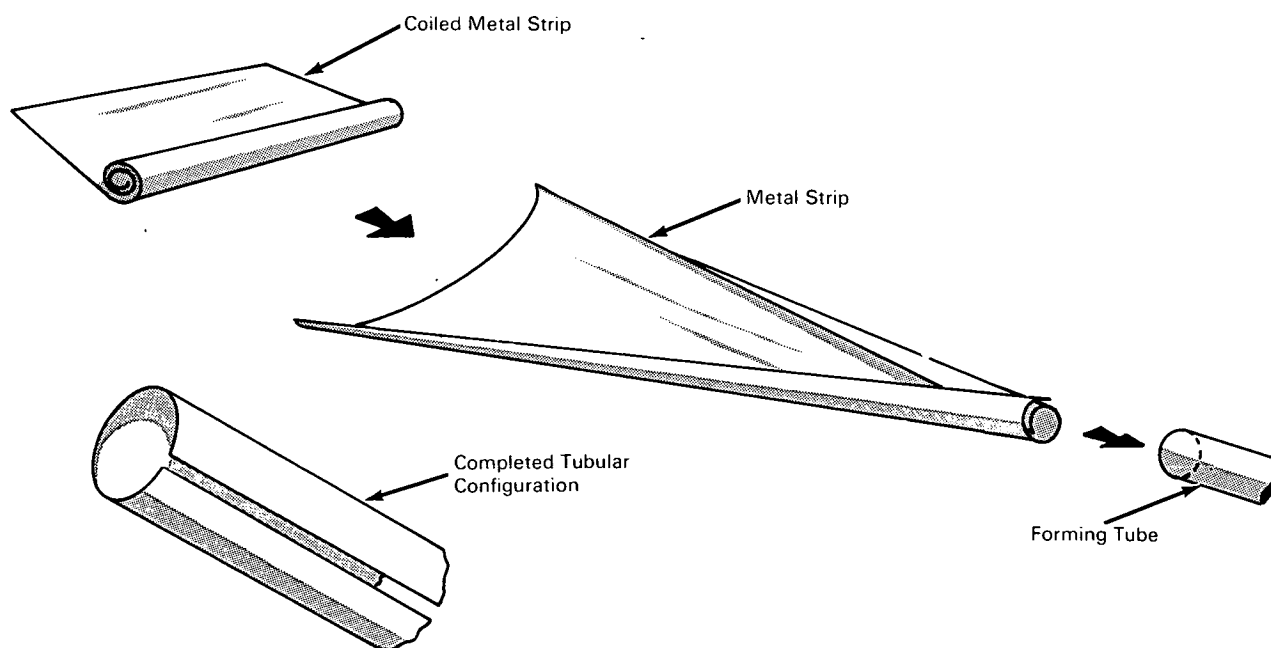


NASA TECH BRIEF



NASA Tech Briefs are issued to summarize specific innovations derived from the U. S. space program and to encourage their commercial application. Copies are available to the public from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia 22151.

Coiled Sheet Metal Strip Opens into Tubular Configuration



The problem: To devise a method of converting a strip of copper or copper-based alloy into a springy material that can be rolled into a compact coil which will spontaneously open to form a tube in the long direction of the strip when a restraining force is released. The strip must be capable of withstanding repeated cycling between the coiled and tubular forms.

The solution: Pass the copper alloy strip through a furnace at a prescribed temperature while restraining the strip in the desired tubular configuration, the temperature depending upon the composition of the strip.

How it's done: Experiments were conducted using a glass tube (0.65-inch i.d.) and strips of a beryllium-copper alloy (2-inch width \times 0.002-inch thick) to determine the time-temperature parameters required to convert the strips into the desired tubular configurations. Each of several strips of the alloy was forced lengthwise into the glass tube which was then placed in a furnace maintained at a prescribed temperature for a given period of time. The test strip was then removed from the furnace and allowed to cool at room temperature.

The experiments indicated that desired results can be obtained after heat treatment of the alloy strip at

(continued overleaf)

various combinations of time and temperature. A copper alloy tube of 0.65-inch-diameter (equal to the inside diameter of the glass forming tube) was formed by heating the material at 920°F for only 4 minutes. At a temperature of 770°F, heating for 15 minutes produced a tube having a diameter of 0.68 inch.

Notes:

1. The parameters for converting a strip of copper alloy into a tubular configuration, as summarized above, are believed to be new, although similar tubular material can be obtained from at least one commercial source. There apparently are no previously published data on the temperature-time requirements for producing the tubular configuration from a metal strip.
2. The principle of this method should be applicable to various other metals.

3. This material may have application in equipment requiring compact elements which can be quickly extended into tubular structures. Examples are radio antennas and support columns for sensors.
4. An application of this material is described in NASA Tech Brief B64-10011 May 1964.
5. Inquiries may also be directed to:

Technology Utilization Officer
Goddard Space Flight Center
Greenbelt, Maryland. 20771
Reference: B66-10009

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: John J. Park,
Goddard Space Flight Center
(GSFC-425)